

AN ANTENATAL EVALUATION OF UMBILICAL AND MIDDLE CEREBRAL ARTERY DOPPLER VELOCIMETRY AND IT'S CORRELATION WITH PERINATAL OUTCOME IN INTRA UTERINE GROWTH RESTRICTION

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ABSTRACT

BACKGROUND

Intrauterine growth restriction is a term used to describe the foetus with birth weight at or below the 10th percentile for gestational age and sex. The aim of the study is to correlate between Doppler abnormalities and adverse perinatal outcomes in IUGR patients.

METHODS

In our hospital based observational study, 100 patients with diagnosed intrauterine growth restriction at 37 – 40 weeks were examined with Doppler ultrasonography; patients were followed up till delivery and perinatal outcomes were noted.

RESULTS

All adverse perinatal outcomes like low birth weight, APGAR score, admission in SNCU and rate of caesarean section were significantly increased in patients with abnormal Doppler parameters.

CONCLUSIONS

Doppler ultrasound has significant role in predicting adverse perinatal outcome in IUGR foetus.

KEYWORDS: *Umbilical & Middle Cerebral Artery, Doppler Velocimetry & IUGR*

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INTRODUCTION

Intrauterine growth restriction is a term used to describe the foetus with a birth weight at or below 10th percentile for gestational age and age. The incidence of IUGR varies between 3 – 10 % of all live births. It is the leading cause of low birth weight babies in India. Accurate and timely detection of foetal growth restriction has been a major concern for obstetricians for years. Doppler ultrasound provides a unique, non invasive and safe method of studying blood flow characteristics in both the fetoplacental and uteroplacental circulations. Changes in Doppler flow velocity waveform of the umbilical artery and foetal middle cerebral artery are good predictors of adverse perinatal outcome in terms of timing of delivery, caesarean section, admission in neonatal intensive care unit as well as various early complications in new born.

The aims of the study were to evaluate the Doppler changes in foetal arterial system (especially in middle cerebral artery, umbilical artery) in IUGR and to find any possible correlation between Doppler abnormalities and adverse perinatal outcomes in IUGR. The objective were to assess changes in end diastolic flow in selected vessels in growth restricted foetus, to record Pulsatility index (PI) from Umbilical artery and Middle cerebral artery in IUGR foetus, to evaluate Doppler abnormalities with adverse perinatal outcomes (Mode of delivery, APGAR score at 1 & 5 minutes), to find out admission rate in SNCU and no of days of stay in SNCU in diagnosed IUGR with Doppler abnormalities.

MATERIALS AND METHODS

This hospital based observational study was carried out in the Department of Obstetrics and Gynaecology, Malda Medical College & Hospital, Malda for one year (1st April 2017 to 31st March 2017). Since this is a tertiary referral centre, patients mostly come from remote areas. 100 pregnant women within 37 – 40 weeks of gestation who were diagnosed as intra uterine growth restriction by clinically and previous ultrasonography scan were included in this study. The mothers were referred to the Department of Radiology for Doppler evaluation. Doppler velocimetry and AFI were done along with measurement of PI from UA, MCA changes and UA Flow Velocity Waveform were seen. Umbilical PI value > 1.42 and MCA PI < 1.5 were taken as abnormal. Pregnancies were followed up to termination . Adverse perinatal outcomes were assessed.

RESULTS

Table 1: Correlation of Doppler Velocimetry with Mode of Delivery in IUGR

Variables	Mode of Delivery		Total (n = 100)	P Value
	VD (n=42)	CS (n= 58)		
UA PI				
Normal	38 (63.33 %)	22 (36.67%)	60	< 0.001
Abnormal	4 (10 %)	36 (90%)	40	
UA diastolic flow				
Normal	30 (75 %)	10 (25%)	40	< 0.001
Abnormal	12 (20%)	48 (80%)	60	
MCA PI				
Normal	39 (55.71%)	31 (44.29%)	70	< 0.001
Abnormal	3 (10%)	27 (90%)	30	
MCA PI/ UA PI				
Normal	40 (53.33%)	35 (46.67%)	75	< 0.001
Abnormal	2 (8%)	23 (92%)	25	

Table 2: Correlation of Doppler Velocimetry with Birth Weight of Babies in IUGR

Variables	Birth Weight (kg)			Total (n=100)	P Value
	< 2 (n 1= 30)	2 – 2.25 (n 2 = 58)	2.25 -2.5 (n3 = 12)		
UA PI					
Normal	7 (11.6%)	45 (75%)	8 (13.33%)	60	< 0.001
Abnormal	23 (57.50 %)	13 (32.5%)	4 (10.00%)	40	
UA Diastolic flow					
Normal	3 (7.50%)	31 (77.50)	6 (15.00%)	40	< 0.001
Abnormal	27 (45.00 %)	27 (45.00%)	6 (10.00 %)	60	
MCA PI					
Normal	7 (10.00%)	51 (72.86%)	12 (17.14%)	70	< 0.001
Abnormal	23 (76.67 %)	7 (23.33%)	0 (0%)	30	

Table 2: Contd.,					
MCA PI/ UA PI					
Normal	8 (10.67%)	55 (73.33%)	12(16%)	75	< 0.001
Abnormal	22 (88.00%)	3 (12.00%)	0 (0%)	25	

Table 3: Correlation of Doppler Velocimetry with APGAR Score at 1 Minute of Babies in IUGR

Variables	APGAR Score at 1 min		Total (n = 100)	P Value
	< 7 (n = 32)	>7 (n =68)		
UA PI				
Normal	(21.67%)	47 (78.33%)	60	<0.001
Abnormal	19 (47.50%)	21 (52.50%)	40	
UA Diastolic flow				
Normal	6 (16.00%)	34 (85.00%)	40	< 0.001
Abnormal	26 (43.33%)	34 (56.67%)	60	
MCA PI				
Normal	14 (20.00%)	56 (80.00%)	70	< 0.001
Abnormal	18 (60.00%)	12 (40.00%)	30	
MCA PI/ UA PI				
Normal	14 (18.67%)	61 (81.33%)	75	< 0.001
Abnormal	18 (72.00%)	7 (28.00%)	25	

** Chi – Square test / Fisher Exact test

Table 4: Correlation of Doppler Velocimetry with APGAR Score at 5 Minutes

Variables	APGAR Score at 5 min		Total (n = 100)	P Value
	< 7 (n= 25)	>7 (n = 75)		
UP PI				
Normal	8 (13.33%)	52 (86.67%)	60	0.001
Abnormal	17 (42.50%)	23 (57.50%)	40	
UA Diastolic flow				
Normal	4 (10%)	36 (90%)	40	0.005
Abnormal	21 (35%)	39 (65%)	60	
MCA PI				
Normal	8 (11.43%)	62 (88.57%)	70	< 0.001
Abnormal	17 (56.67%)	13 (43.33%)	30	
MCA PI/UA PI				
Normal	8 (10.67%)	67 (89.33%)	75	< 0.001
Abnormal	17 (68%)	8 (32%)	35	

** Chi – Square test / Fisher Exact test

Table 5: Correlation of Doppler Velocimetry with SNCU Admission of Babies in IUGR

Variables	SNCU		Total (n = 100)	P Value
	Yes (n = 30)	No (n = 70)		
UA PI				
Normal	12 (20%)	48 (80%)	60	0.008
Abnormal	18 (45%)	22 (55%)	40	
UA Diastolic flow				
Normal	6 (15%)	34 (85%)	40	0.008
Abnormal	24 (40%)	36 (60%)	60	
MCA PI				
Normal	12 (17.14%)	58 (82.86%)	70	< 0.001
Abnormal	18 (60%)	12 (40%)	30	
MCA PI/UA PI				
Normal	13 (16%)	63 (84%)	75	< 0.001
Abnormal	18 (72%)	7 (28%)	25	

** Chi – Square test / Fisher Exact test

DISCUSSIONS

Caesarean sections were high (58 %) in this study and 42% was vaginal delivery. 80% of patients with abnormal umbilical artery Pulsatility Index had CS; while the corresponding figures for those with abnormal UA PI and Middle cerebral artery PI were 90% and 92% respectively.

In table 2, among 60 patients with abnormal UA diastolic flow, 27 babies (45 %) were under < 2 kg of birth weight. Among groups with abnormal UA PI, abnormal MCA PI and altered CP ratio 57.5 %, 76.67% and 88% of babies were below 2.5 kg respectively.

Table 3 shows the incidence of low APGER score at 1 minute are significantly higher in cases with abnormal Doppler parameters. As per table 4, the incidence of low APGAR score at 5 minutes are significantly higher than that of normal doppler cases (13.33%, 11.43%, 10.67%).

45%, 40%, 60% and 72% neonates were admitted in SNCU in cases of abnormal UA PI, abnormal diastolic flow of UA, abnormal MCA PI and abnormal CP ratio respectively as shown in table 5. Out of 30 neonates admitted in SNCU, 20 neonates had to stay in SNCU for > 24 hours.

CONCLUSIONS

Fetuses with abnormal PI in MCA or UA and abnormal UA with diastolic flow are at increased risk of adverse perinatal outcomes in IUGR. Incidence of operative deliveries (caesarean section) is significantly increased when there is abnormal Doppler findings. This study noted that the rate of low birth weight was significantly higher in abnormal Doppler cases than normal doppler cases. Perinatal morbidity is increased in cases with abnormal Doppler findings as evidenced by low APGER score at 1 minute and 5 minutes, SNCU admission and SNCU stay . An abnormal cerbroplacental ratio is maximally correlated with adverse perinatal outcomes in IUGR. 2% intra uterine foetal death was seen in case of REDF (Reverse end diastolic flow).

Therefore, Doppler ultrasonography of foetal vessels is very useful tool in assessing adverse perinatal outcomes in pregnancies with IUGR. Although a larger study with more cases will be more helpful in assessing the exact roles of Doppler ultrasonography in pregnancies with IUGR.

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